Application No. 10/551,244   Docket No.: 215384-101174
Amendment dated
Reply to Office Action of September 16, 2008

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A transmitter apparatus comprising:

an input receiving section that receives inputs of multiple synchronized signals r_1, ..., r_N;

an asynchronizing section that delays the multiple input received synchronized signals r_1, ..., r_N by time$\underline{s}$ t_1, ..., t_N, **respectively,** to output multiple asynchronized signals v_1, ..., v_N;

a modulating section that modulates the output multiple asynchronized signals v_1, ..., v_N to output modulated signals w_1, ..., w_L ($1 \leq L \leq N$); and

a transmitting section that transmits the output modulated signals w_1, ..., w_L, **and**

wherein **the delay times t_1, ..., t_N are respectively proportional to values u_1, ..., u_N which are computed from a prestored integer value a, a predetermined nonlinear transformation f(·) over a finite field, and the equations:**

$u_1 = a$;

$u_{j+1} = f(u_j)$ $(1 \leq j \leq N)$.

[the delay time t_1, ..., t_N is shorter than a reciprocal number of a minimum value of clock rates of the multiple input received synchronized signals r_1, ..., r_N]

2. (Currently Amended) The transmitter apparatus according to claim 1, further comprising:

a storing section that stores the delay time$\underline{s}$ t_1, ..., t_N in advance,

wherein the asynchronizing section delays the respective multiple synchronized signals r_1, ..., r_N by the time t_1, ..., t_N stored in the storing section.

3. (Currently Amended) The transmitter apparatus according to claim 1, wherein the modulating section classifies the asynchronized signals v_1, ..., v_N into L ($L \leq N$) signal groups to send the respective classified L signal groups to any one of L spread spectrum modulators not to be overlapped with one another to output the modulated signals w_1, ..., [v_L] $\underline{w_L}$.

4. (Original) The transmitter apparatus according to claim 3, wherein the transmitting section radio-transmits the respective modulated signals w_1, ..., w_L by L radio frequency modulators each using a different carrier frequency.

5. (Original) The transmitter apparatus according to claim 3, wherein the transmitting section

sends the modulated signals $w_1, ..., w_L$ to I-channels and Q-channels of each of L/2 radio

frequency modulators each using a different carrier frequency not to be overlapped with one

another to radio-transmit the respective obtained transmitting signals.

6. (Original) The transmitter apparatus according to claim 3, wherein L = 2 is established.

7. (Currently Amended) The transmitter apparatus according to claim 1, **wherein the delay**
times $t_1, ..., t_N$ are shorter than the clock period of the signals $r_1,..., r_N$. [wherein the delay
time $t_1, ..., t_N$ is proportional to $u_1, ..., u_N$ that is determined by the following equation by a
prestored integer value a and a predetermined nonlinear transformation f(·) over a finite field:]

      [$u_1 = a$;]
      [$u_{j+1} = f(u_j)$ ($1 \leq j < N$).]

8. (Currently Amended) The transmitter apparatus according to claim [7] 1, wherein the
prestored value a is updated to a = $f(u_N)$ every time when predetermined time passes, and
thereby the delay times $t_1, ..., t_N$ is updated.

9. (Currently Amended) The transmitter apparatus according to claim [7] 1, wherein the
predetermined nonlinear transformation f(·) over a finite field corresponds to any one of the
following (a) to (e):

      (a) transformation using a Chebyshev polynomial of second or more degree,

      (b) transformation using Bernoulli mapping,

      (c) transformation $f(x) = 2x^2 - px + q$ (mod 2^w) defined using integers p, q (p mod 4 = 1,
$0 \leq q \leq 2^{w-1}$),

      (d) transformation using a remainder obtained by dividing any one of transformation
results of (a) to (c) by a predetermined integer, and

      (e) transformation that is the same form as any one of the above (a) to (d) by a linear
coordinate transformation.

10. (Currently Amended) A receiver apparatus comprising:

      a receiving section that receives multiple signals as $a_1, ..., a_L$ ($1 \leq L$);

a delaying section that delays the respective multiple received signals $a_1, ..., a_L$ by time $T - t_1, ..., T - t_N$ ($L \leq N$) where T is predetermined constant time without being overlapped with one another to output multiple intermediate signals $p_1, ..., p_N$;

a demodulating section that demodulates the multiple output intermediate signals $p_1, ..., p_N$ to output demodulated signals $r_1, ..., r_N$; and

an outputting section that outputs the multiple output demodulated signals $r_1, ..., r_N$ as multiple transmitted synchronized signals, **and**

wherein **the delay times $t_1, ..., t_N$ are respectively proportional to values $u_1, ..., u_N$ which are computed from a prestored integer value a, a predetermined nonlinear transformation f(·) over a finite field, and the equations:**

$$\underline{u_1 = a:}$$
$$\underline{u_{j+1} = f(u_j) \quad (1 \leq j \leq N).}$$

11. (Currently Amended) The receiver apparatus according to claim 10, further comprising:

a storing section that stores the predetermined constant time T and time$\underline{s}$ $t_1, ..., t_N$ in advance,

wherein the delaying section obtains delay time$\underline{s}$ of the respective multiple synchronized signals $r_1, ..., r_N$ from time stored in the storing section and delays the synchronized signals by time$\underline{s}$ $T - t_1, ..., T - t_N$.

12. (Currently Amended) The receiver apparatus according to claim 10, wherein the delaying section classifies the delay time$\underline{s}$ $T - t_1, ..., T - t_N$ into L delay time groups, and uses the respective classified L delay time groups not to be overlapped with the received signals $a_1, ..., a_L$ to output the intermediate signals $p_1, ..., p_N$.

13. (Original) The receiver apparatus according to claim 12, where the receiving section obtains the respective received signals $a_1, ..., a_L$ from L radio frequency modulators each using a different carrier frequency.

14. (Original) The receiver apparatus according to claim 12, wherein the receiving section obtains the received signals $a_1, ..., a_L$ from I-channels and Q-channels of each of L/2 radio

frequency modulators each using a different carrier frequency not to be overlapped with one another.

15. (Original) The receiver apparatus according to claim 14, wherein L = 2 is established.

16. (Currently Amended) The receiver apparatus according to claim 10, **wherein the delay times t_1, ..., t_N are shorter than the clock period of the signals r_1,..., r_N.** [wherein the time t_1, ..., t_N is proportional to u_1, ..., u_N that is determined by the following equation by a prestored integer value a and a predetermined nonlinear transformation $f(\cdot)$ over a finite field:]
[$u_1 = a$;]
[$u_{j+1} = f(u_j)$ $(1 \leq j < N)$.]

17. (Currently Amended) The receiver apparatus according to claim [16] **10**, wherein the prestored value a is updated to a = $f(u_N)$ every time when predetermined time passes, and thereby the delay time$\underline{s}$ t_1, ..., t_N is updated.

18. (Currently amended) The receiver apparatus according to claim [16] **10**, wherein the predetermined nonlinear transformation $f(\cdot)$ over a finite field corresponds to any one of the following (a) to (e):

(a) transformation using a Chebyshev polynomial of second or more degree,

(b) transformation using Bernoulli mapping,

(c) transformation $f(x) = 2x^2 - px + q$ (mod 2^w) defined using integers p, q (p mod 4 = 1, $0 \leq q \leq 2^{w-1}$),

(d) transformation using a remainder obtained by dividing any one of transformation results of (a) to (c) by a predetermined integer, and

(e) transformation that is the same form as any one of the above (a) to (d) by a linear coordinate transformation.

19. (Currently Amended) A transmission method comprising:

the input receiving step of receiving inputs of multiple synchronized signals r_1, ..., r_N;

the asynchronizing step of delaying the multiple input received synchronized signals r_1,

..., t_N by times t_1, ..., t_N, respectively, to output multiple asynchronized signals v_1, ..., v_N;

the modulating step of modulating the output multiple asynchronized signals v_1, ..., v_N to output modulated signals w_1, ..., w_L ($1 \leq L \leq N$); and

the transmitting step of transmitting the output modulated signals w_1, ..., w_L, and

wherein the delay times t_1, ..., t_N are respectively proportional to values u_1, ..., u_N which are computed from a prestored integer value a, a predetermined nonlinear transformation f(·) over a finite field, and the equations:

$u_1 = a$;

$u_{j+1} = f(u_j)$ ($1 \leq j \leq N$).

[the delay time t_1, ..., t_N is shorter than a reciprocal number of a minimum value of clock rates of the multiple input received synchronized signals r_1, ..., r_N.]

20. (Currently Amended) The transmission method according to claim 19,

wherein a storing section that stores the delay times t_1, ..., t_N in advance is used; and

wherein the respective multiple synchronized signals r_1, ..., t_N are delayed by the time t_1, ..., t_N stored in the storing section in the asynchronizing step.

21. (Original) The transmission method according to claim 19, wherein the asynchronized signals v_1, ..., v_N are classified into L (L≤N) signal groups and the respective classified L signal groups are sent to any one of L spread spectrum modulators not to be overlapped with one another to output the modulated signals w_1, ..., w_L in the modulating step.

22. (Original) The transmission method according to claim 21, wherein the respective modulated signals w_1, ..., w_L are radio-transmitted by L radio frequency modulators each using a different carrier frequency in the transmitting step.

23. (Original) The transmission method according to claim 21, wherein the modulated signals w_1, ..., w_L are sent to I-channels and Q-channels of each of L/2 radio frequency modulators each using a different carrier frequency not to be overlapped with one another to radio-transmit each of the obtained transmitting signals in the transmitting step.

24. (Original) The transmission method according to claim 23, wherein L = 2 is established.

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25. (Currently Amended) The transmission method according to claim 19, <u>wherein the delay</u> <u>times $t_1, ..., t_N$ are shorter than the clock period of the signals $r_1, ..., r_N$.</u> [wherein the delay time $t_1, ..., t_N$ is proportional to $u_1, ..., u_N$, that is determined by the following equation by a prestored integer value a and a predetermined nonlinear transformation f(·) over a finite field:]

[$u_1 = a$;]

[$u_{j+1} = f(u_j)$ ($1 \leq j < N$).]

26. (Currently Amended) The transmission method according to claim [25] <u>19</u>, wherein the prestored value a is updated to a = $f(u_N)$ every time when predetermined time passes, and thereby the delay time<u>s</u> $t_1, ..., t_N$ is updated.

27. (Currently Amended) The transmission method according to claim [25] <u>19</u>, wherein the predetermined nonlinear transformation f(·) over a finite field corresponds to any one of the following (a) to (e):

(a) transformation using a Chebyshev polynomial of second or more degree,

(b) transformation using Bernoulli mapping,

(c) transformation $f(x) = 2x^2 - px + q$ (mod 2^w) defined using integers p, q (p mod 4 = 1, $0 \leq q \leq 2^{w-1}$),

(d) transformation using a remainder obtained by dividing any one of transformation results of (a) to (c) by a predetermined integer, and

(e) transformation that is the same form as any one of the above (a) to (d) by a linear coordinate transformation.

28. (Currently Amended) A reception method comprising:

the receiving step of receiving multiple signals as $a_1, ..., a_L$ ($1 \leq L$);

the delaying step of delaying the respective multiple received signals $a_1, ..., a_L$ by time T - $t_1, ..., T - t_N$ ($L \leq N$) where T is predetermined constant time without being overlapped with one another to output multiple intermediate signals $p_1, ..., p_N$;

the demodulating step of demodulating the multiple output intermediate signals $p_1, ..., p_N$ to output demodulated signals $r_1, ..., r_N$; and

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the outputting step of outputting the multiple output demodulated signals $r_1, ..., r_N$ as multiple transmitted synchronized signals, **and**

wherein the delay times $t_1, ..., t_N$ are respectively proportional to values $u_1, ..., u_N$ which are computed from a prestored integer value a, a predetermined nonlinear transformation $f(\cdot)$ over a finite field, and the equations:

$u_1 = a;$

$u_{i+1} = f(u_i)$ $(1 \leq i \leq N).$

29. (Currently Amended) The reception method according to claim 28,

wherein a storing section that stores the predetermined constant time T and time$\underline{s}$ $t_1, ...,$ t_N in advance is used; and

wherein delay time$\underline{s}$ of the respective multiple synchronized signals $r_1, ..., r_N$ is obtained from time stored in the storing section and the synchronized signals are delayed by the time $T - t_1, ..., T - t_N$ in the delaying step.

30. (Currently Amended) The reception method according to claim 28, wherein the delay time$\underline{s}$ $T - t_1, ..., T - t_N$ are classified into L delay time groups, and the respective classified L delay time groups are used not to be overlapped with the received signal $a_1, ..., a_L$ to output the intermediate signals $p_1, ..., p_N$ in the delaying step.

31. (Original) The reception method according to claim 30, where the respective received signals $a_1, ..., a_L$ are obtained from L radio frequency modulators each using a different carrier frequency in the receiving step.

32. (Original) The reception method according to claim 30, wherein the received signals $a_1, ...,$ a_L are obtained from I-channels and Q-channels of each of $L/2$ radio frequency modulators each using a different carrier frequency not to be overlapped with one another in the receiving step.

33. (Original) The reception method according to claim 32, wherein $L = 2$ is established.

34. (Currently Amended) The reception method according to claim 28, **wherein the delay times**

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$t_1, ..., t_N$ **are shorter than the clock period of the signals** $r_1, ..., r_N$. [wherein the time $t_1, ..., t_N$ is proportional to $u_1, ..., u_N$, that is determined by the following equation by a prestored integer value a and a predetermined nonlinear transformation f(·) over a finite field:]

[$u_1 = a;$]

[$u_{j+1} = f(u_j) (1 \le j < N)$.]

35. (Currently Amended) The reception method according to claim [34] **28**, wherein the prestored value a is updated to a = $f(u_N)$ every time when predetermined time passes, and thereby the delay time$\underline{s}$ $t_1, ..., t_N$ is updated.

36. (Currently Amended) The reception method according to claim [34] **28**, wherein the predetermined nonlinear transformation f(·) over a finite field corresponds to any one of the following (a) to (e):

(a) transformation using a Chebyshev polynomial of second or more degree,

(b) transformation using Bernoulli mapping,

(c) transformation $f(x) = 2x^2 - px + q \pmod{2^w}$ defined using integers p, q (p mod 4 = 1, $0 \le q \le 2^{w-1}$),

(d) transformation using a remainder obtained by dividing any one of transformation results of (a) to (c) by a predetermined integer, and

(e) transformation that is the same form as any one of the above (a) to (d) by a linear coordinate transformation.

37. (Currently Amended) A **computer-readable storage device, having stored thereon instructions for execution by** program causing a computer, [(]including FPGA (Field Programmable Gate Array), DSP (Digital Signal Processor), ASIC (Application Specific Integrated Circuit)[)] to **carry out the functions recited in claim 1.** function as the respective sections described in any one of claims 1 to 9.

38. (Currently Amended) A **computer-readable storage device, having stored thereon instructions for execution by** program causing a computer, [(]including FPGA (Field Programmable Gate Array), DSP (Digital Signal Processor), ASIC (Application Specific

Integrated Circuit)~~[)]~~ to **carry out the functions recited in claim 10.**~~function as the respective sections described in any one of claims 10 to 18.~~

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